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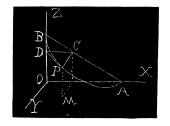
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the given circumference, (x, y, z); and the coördinates of M, the projection of P on the xy plane, (x, y).

Then
$$DC = bx/a$$
; $BC = \sqrt{(a^2 + b^2)^{\frac{x}{a}}}$;

$$CA = \frac{\sqrt{(a^2 + b^2)(a - x)}}{a}$$
; and $PC = \sqrt{(BC.CA)}$

$$=\frac{1/[(a^2+b^2)(a-x)x}{a}.$$



$$\therefore DP^2 = \frac{b^2x^2 + (a^2 + b^2)(a - x)x}{a^2}.$$

As the circle with radius DP moves parallel to itself and with its center on AB, it generates the volume required.

$$\therefore V = \frac{\pi}{a^2} \int_0^a [b^2 x^2 + (a^2 + b^2)(a - x)x] dx = \frac{\pi a}{6} (a^2 + 3b^2).$$

MECHANICS.

97. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester. Pa.

The side AB of the parallelogram ABCD will be a principal axis at the point which divides the distance between the middle point and the foot of the perpendicular from the middle-point of the opposite side in the ratio 2:1. The principal moments of inertia about this point are $\frac{1}{3}mb^2\sin^2\beta$, $\frac{1}{36}m(3a^3+4b^2\cos^2\beta)$, where $\beta=\angle A$.

Solution by the PROPOSER.

Let EH=c, and let H be the origin, and lines through H parallel to EF, FB axes of coördinates.

$$\therefore \sum mxy = \rho \sin^2 \beta \int_{-1a-c}^{\frac{1}{2}a-c} \int_{0}^{b} y(x+y\cos \beta) dxdy$$

 $=\frac{1}{6}mb\sin\beta(2b\cos\beta-3c)=0$ if HB is a principal axis.

$$c = \frac{2}{3}b\cos\beta$$
. But $FG = b\cos\beta$. $c : FH : HG = 2 : 1$.

$$\sum my^2 = \rho \sin^3 \beta \int_{-\frac{1}{2}a-c}^{\frac{1}{2}a-c} \int_0^b y2dxdy = \frac{1}{3}mb^2 \sin^2 \beta.$$

$$\sum mx^{2} = \rho \sin\beta \int_{-\frac{1}{2}a-c}^{\frac{1}{2}a-c} \int_{0}^{b} (x+y\cos\beta)^{2} dx dy = \frac{1}{12}m(a^{2}+12c^{2}-12b\cos\beta+4b^{2}\cos^{2}\beta)$$
$$= \frac{1}{2}m(3a^{2}+4b^{2}\cos^{2}\beta).$$